

**REMARKS****Summary of the Office Action**

In the Office Action, claims 1, 3, 6, 7 and 11-15 stand rejected under 35 U.S.C. § 103 (a), as being unpatentable over U.S. Patent Application Publication No. 2001/0006408 to *Matsuyama* in view of U.S. Patent Nos. 6,476,890 to *Funahata*, 6,593,982 to *Yoon*, 6,504,592 to *Takatori*, 6,441,878 to *Wong* and 6,424,398 to *Taniguchi*.

Claims 16-19 stand rejected under 35 U.S.C. § 103 (a), as being unpatentable over U.S. Patent Application Publication No. 2001/0006408 to *Matsuyama* in view of U.S. Patent Application Publication No. 2001/0007487 to *Yoon*, in view of U.S. Patent Nos. 6,593,982 to *Yoon*, 6,504,592 to *Takatori*, 6,525,797 to *Tsuda* and 6,424,398 to *Taniguchi*.

**Summary of the Response to the Office Action**

Applicant proposes amending the specification, Figs. 5 and 6, and claims 1, 7, 16, 18 and 19. Accordingly, claims 1, 3, 6, 7 and 11-19 (claims 2, 4, 5 and 8-10 having been cancelled) are pending for further consideration.

**All Claims are Allowable**

In the Office Action, claims 1, 3, 6, 7 and 11-15 stand rejected under 35 U.S.C. § 103 (a), as being unpatentable over U.S. Patent Application Publication No. 2001/0006408 to *Matsuyama* in view of U.S. Patent Nos. 6,476,890 to *Funahata*, 6,593,982 to *Yoon*, 6,504,592 to *Takatori*, 6,441,878 to *Wong* and 6,424,398 to *Taniguchi*. Applicant traverses this rejection for the following reasons.

With regard to independent claim 1, Applicant respectfully asserts that *Matsuyama*, *Funahata*, *Yoon*, *Takatori*, *Wong* and *Taniguchi*, viewed either singly or in combination, do not teach or suggest a liquid crystal display device, including at least, “a first substrate and a second substrate ... a liquid crystal ... a plurality of color filters ... a common electrode on the color filters, the common electrode having a surface facing to the second substrate and a plurality of second depressions corresponding to the first depressions of the color filters; and a dielectric material filling up the second depressions of the common electrode, the dielectric material having a dielectric constant smaller than the dielectric constant of the liquid crystal, wherein the

dielectric material has a substantially flat surface level with the surface of the common electrode,” as recited in independent claim 1, as amended.

Support for these features recited in claim 1 can be found at least on Pages 3-6 of the originally filed specification, and in Figs. 5-8 of the originally filed drawings. Specifically, as shown in Fig. 5, the present invention provides a liquid crystal display device 100 including first and second substrates 102, 104 processed for vertical alignment. A liquid crystal having a negative dielectric constant anisotropy is sandwiched between the first and second substrates. A plurality of color filters 124 are provided on first substrate 102 and each of the color filters includes at least a first depression 124a formed therein. A common electrode 112 is provided on the color filters and includes a surface facing to the second substrate and a plurality of second depressions 112a corresponding to first depressions 124a of the color filters. A dielectric material having a dielectric constant smaller than the dielectric constant of the liquid crystal may fill up second depressions 112a of common electrode 112. As illustrated in Fig. 5, the dielectric material has a substantially flat surface level with the surface of the common electrode.

The Office Action cites *Matsuyama, Funahata, Yoon, Takatori, Wong and Taniguchi* as teaching or suggesting the invention recited in independent claims 1, and dependent claims 3 and 6.

Specifically, as illustrated in Figs. 2A-3B of *Matsuyama*, there is disclosed a liquid crystal display device including pixel color layers 6B, 6R and 6G. As correctly noted in the Office Action, *Matsuyama* fails to teach or suggest several recited features in independent claim 1 of the present invention. The Office Action therefore cites the teachings of *Funahata, Yoon, Takatori, Wong and Taniguchi*, as disclosing a liquid crystal display structure including depressions, and the protrusion configuration recited in independent claim 1 of the present invention.

Applicant however respectfully asserts that despite the stated combination of *Matsuyama, Funahata, Yoon, Takatori, Wong and Taniguchi*, these references still fail to teach or suggest “a dielectric material filling up the second depressions of the common electrode, the dielectric material having a dielectric constant smaller than the dielectric constant of the liquid crystal,” or “the dielectric material ha[ving] a substantially flat surface level with the surface of the common electrode,” as recited in independent claim 1, as amended.

As discussed on page 3, lines 13-19 of the originally filed specification, in providing the “the dielectric material ha[ving] a substantially flat surface level with the surface of the common electrode,” as recited in independent claim 1, “since the liquid crystal molecules are aligned vertically to the surface of the substrate in principle, the pre-tilt angle of liquid crystal molecules near the second depressions of the common electrode is minimized thereby improving the response (switching) speed for transition from a state in which no voltage is applied to a state in which a voltage is applied.”

Applicant respectfully asserts that the aforementioned benefit of providing the “the dielectric material ha[ving] a substantially flat surface level with the surface of the common electrode,” is neither taught nor suggested by *Matsuyama, Funahata, Yoon, Takatori, Wong and Taniguchi*.

In this regard, as discussed on page 5, lines 11-13, 17 and 28-29, the configuration of a dielectric material filling up the second depressions of the common electrode provides improvement in the response (switching) speed of the liquid crystal molecules for transition from a state in which no voltage is applied to a state in which a voltage is applied and for obtaining a higher contrast. None of these benefits are taught, suggested or contemplated by the inventions of *Matsuyama, Funahata, Yoon, Takatori, Wong and Taniguchi*.

Applicant further respectfully asserts that any further suggestion in the Office Action of the invention as recited in independent claim being obvious over the teachings of *Matsuyama, Funahata, Yoon, Takatori, Wong and Taniguchi* could only be based upon impermissible hindsight. Specifically, with regard to impermissible hindsight, Applicant respectfully notes that in order to establish a prima facie case of obviousness, three basic criteria must be met, as set forth in M.P.E.P. § 2142.

First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Applicant respectfully asserts that based upon the aforementioned deficiencies cited in the teachings of *Matsuyama, Funahata, Yoon, Takatori, Wong and Taniguchi*, these references clearly do not teach or suggest “a dielectric material filling up the second depressions of the common electrode, the dielectric material having a dielectric constant smaller than the dielectric constant of the liquid crystal,” or “the dielectric

material has a substantially flat surface level with the surface of the common electrode,” as recited in independent claim 1, as amended.

Second, there must be a reasonable expectation of success. Since none of the cited references recognize drawbacks, such as the slow response (switching) speed of a conventional vertically-aligned LCD (i.e. as illustrated in Fig. 4 and discussed on page 2, lines 9-28 of the original specification), one of ordinary skill in the art could not reasonably contemplate the invention as recited in independent claim 1, from the teachings of the applied references themselves.

Finally, the prior art reference, and not the Applicant’s disclosure must teach or suggest all the claim limitations. In this regard, it is only through extensive research, analysis and experimentation, by which the Applicant of the invention herein devised the use of “a dielectric material filling up the second depressions of the common electrode, the dielectric material having a dielectric constant smaller than the dielectric constant of the liquid crystal,” and “the dielectric material has a substantially flat surface level with the surface of the common electrode,” as recited in independent claim 1, as amended. as recited in independent claim 1, as amended. Applicant respectfully asserts that any unfounded combination of the teachings of *Matsuyama, Funahata, Yoon, Takatori, Wong* and *Taniguchi* could only be based on reliance on Applicant’s disclosure, and not the cited references, in concluding that the invention as claimed would be obvious.

As pointed out in M.P.E.P. § 2143.03, “[t]o establish prima facie obviousness of a claimed invention, all the claimed limitations must be taught or suggested by the prior art”. *In re Royka*, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). Since these criteria have not been met, Applicant respectfully asserts that the rejection under 35 U.S.C. § 103 (a) should be withdrawn because *Matsuyama, Funahata, Yoon, Takatori, Wong* and *Taniguchi* do not teach or suggest each feature of independent claim 1, as amended.

In view of the above arguments, Applicant respectfully requests the rejection of independent claim 1 under 35 U.S.C. § 103 be withdrawn. Additionally, claims 3 and 6, which depend from independent claim 1, are allowable at least because their base claim is allowable, as well as for the additional features recited therein.

Dependent claims 3 and 11

With regard to dependent claims 3 and 11, Applicant respectfully asserts that *Matsuyama, Funahata, Yoon, Takatori, Wong* and *Taniguchi*, viewed either singly or in combination, do not teach or suggest a liquid crystal display device, including at least, “further comprising photodefined spacers disposed between the first and second substrates for defining the gap between the two substrates, and the dielectric material is the same as the material of the photodefined spacers,” as recited in dependent claim 3, and as substantially similarly recited in dependent claim 11.

With regard to dependent claims 3 and 11, Applicant respectfully requests the Examiner to cite the teachings of the aforementioned limitations in *Matsuyama, Funahata, Yoon, Takatori, Wong* and *Taniguchi*, or to withdraw the outstanding rejection.

Independent claim 7

With regard to independent claim 7, Applicant respectfully asserts that *Matsuyama, Funahata, Yoon, Takatori, Wong* and *Taniguchi*, viewed either singly or in combination, do not teach or suggest a liquid crystal display device, including at least, “a dielectric material filling up the second depressions of the common electrode, the dielectric material having a dielectric constant smaller than the dielectric constant of the liquid crystal, wherein the dielectric material forms a plurality of first protrusions over the second depressions; and an array of second protrusions or slits provided on the second substrate, each extending in the direction, the second protrusions, depressions or slits being arranged in parallel to one another with the predetermined pitch among them,” as recited in independent claim 7, as amended.

Applicant respectfully asserts that independent claim 7 is allowable for at least the reasons presented above for the allowance of independent claim 1, and the additional features recited therein. Applicant further respectfully requests the Examiner to cite the teachings of the aforementioned limitations in *Matsuyama, Funahata, Yoon, Takatori, Wong* and *Taniguchi*, or to withdraw the outstanding rejection. In the interest of avoiding redundant arguments, the reasons for the allowance of independent claim 7 are not repeated herein. Additionally, claims 11-15, which depend from independent claim 7, are allowable at least because their base claim is allowable, as well as for the additional features recited therein.

Independent claim 16

With regard to independent claim 16, claims 16-19 stand rejected under 35 U.S.C. § 103 (a), as being unpatentable over U.S. Patent Application Publication No. 2001/0006408 to *Matsuyama* in view of U.S. Patent Application Publication No. 2001/0007487 to *Yoon*, in view of U.S. Patent Nos. 6,593,982 to *Yoon*, 6,504,592 to *Takatori*, 6,525,797 to *Tsuda* and 6,424,398 to *Taniguchi*. Applicant traverses this rejection for the following reasons.

With regard to independent claim 16, Applicant respectfully asserts that *Matsuyama*, *Yoon*, *Takatori*, *Tsuda* and *Taniguchi*, viewed either singly or in combination, do not teach or suggest a method of manufacturing a liquid crystal display device, including the step of, “forming photodefined spacers on the first substrate, the material of the spacers also filling up the second depressions of the common electrode, the material of the spacers having a dielectric constant smaller than the dielectric constant of the liquid crystal; and forming a vertical alignment layer on each of the substrates,” as recited in independent claim 16.

Applicant respectfully asserts that independent claim 16 is allowable for at least the reasons presented above for the allowance of independent claim 1, and the additional features recited therein. Applicant further respectfully requests the Examiner to cite the teachings of the aforementioned limitations in *Matsuyama*, *Yoon*, *Takatori*, *Tsuda* and *Taniguchi*, or to withdraw the outstanding rejection. As discussed above, in the interest of avoiding redundant arguments, the reasons for the allowance of independent claim 16 are not repeated herein. Additionally, claims 17 and 18, which depend from independent claim 16, are allowable at least because their base claim is allowable, as well as for the additional features recited therein.

Independent claim 19

With regard to independent claim 19, Applicant respectfully asserts that *Matsuyama*, *Yoon*, *Takatori*, *Tsuda* and *Taniguchi*, viewed either singly or in combination, do not teach or suggest a method of manufacturing a liquid crystal display device, including the steps of, “forming a common electrode on the color filters, the common electrode having a surface facing to the second substrate and a second depressions corresponding to the first depressions of the color filter layer; and forming a vertical alignment film on each of the substrates, the material of

the vertical alignment film also filling up the second depressions of the common electrode to obtain a substantially flat surface level with the surface of the common electrode, the material of the vertical alignment film having a dielectric constant smaller than the dielectric constant of the liquid crystal," as recited in independent claim 19.

Applicant respectfully asserts that independent claim 19 is allowable for at least the reasons presented above for the allowance of independent claim 1, and the additional features recited therein. Applicant further respectfully requests the Examiner to cite the teachings of the aforementioned limitations in *Matsuyama*, *Yoon*, *Takatori*, *Tsuda* and *Taniguchi*, or to withdraw the outstanding rejection. As discussed above, in the interest of avoiding redundant arguments, the reasons for the allowance of independent claim 19 are not repeated herein.

### CONCLUSION

In view of the foregoing, Applicants respectfully request reconsideration and the timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of the response, the Examiner is invited to contact the Applicants' undersigned representative to expedite prosecution.

If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 04-2223. If a fee is required for an extension of time under 37 C.F.R. §1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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Dated: March 2, 2004

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